Work in Progress - Developing Joint Degrees through E-Learning Systems

Sandra Aguirre, Juan Quemada, Joaquín Salvachúa
Universidad Politécnica de Madrid, saguirre@dit.upm.es, jquemada@dit.upm.es, jsr@dit.upm.es

***Abstract* - The development of Joint Degrees is an important mechanism for opening higher education systems nationwide, adapting them to the international standard, and promoting quality assessment to a broader environment. Since e-Learning systems covers a wide range of academic programs, and as joint degrees such as e-Learning are rapidly growing trends, finding a suitable solution that enables universities to design joint degrees through their own e-Learning systems becomes necessary. This paper introduces the design of a federated service-oriented architecture, which through collaboration agreements, will allow the development of new curricula and the participation in the unstoppable process of globalization.**

Index Terms – Collaboration, e-Learning systems, Joint Degrees, SOA.

INTRODUCTION

The development of a European Space for Higher Education widely known as the Bologna Process is being promoted. The main objectives of the process are the convergence of higher European education, the recognition and quality of studies, and the improvement of international competitiveness in the European educational system.

According to a report by the European Association of Universities [1], joint degrees have an intrinsic link with all of the goals of the Bologna Process because it encourages a close collaboration among different countries. Furthermore, e-Learning has a great potential to meet the objectives established in the Bologna Process.

Currently, the use of e-learning as support tool in educative programs is a growing trend. A wide diversity of e-learning platforms have been developed. However, these platforms are generally developed independently by different organizations, and different technologies are used in them. As a result, the implementation of joint degrees by means of e-Learning systems requires the solution of several technical difficulties generated by the heterogeneity of systems.

A wide range of research proposals concentrate on the interoperability of learning resources [2], educational federated repository systems [4] and e-Learning frameworks [5]-[6]. However, a joint degree scenario requires the creation of new services, as well as the interoperability of additional e-Learning system functionalities. Technical and legal challenges have been identified as barriers in achieving this scenario.

From a technical point of view, our proposal is a federated service-oriented architecture, which through collaboration agreements will permit the interoperability of new functionalities. Joint degrees through e-Learning systems will allow the development of new joint curricula, and the participation in the convergence of Higher Education.

PROJECT DESCRIPTION

In order to allow the development of joint degrees through heterogeneous e-Learning Systems, a federated service-oriented architecture, whose implementation will be based on Web Services, is proposed. Our main objective is to allow E-Learning Systems to be able to work in a collaborative way; combining their data and functionality through the integration of their services.

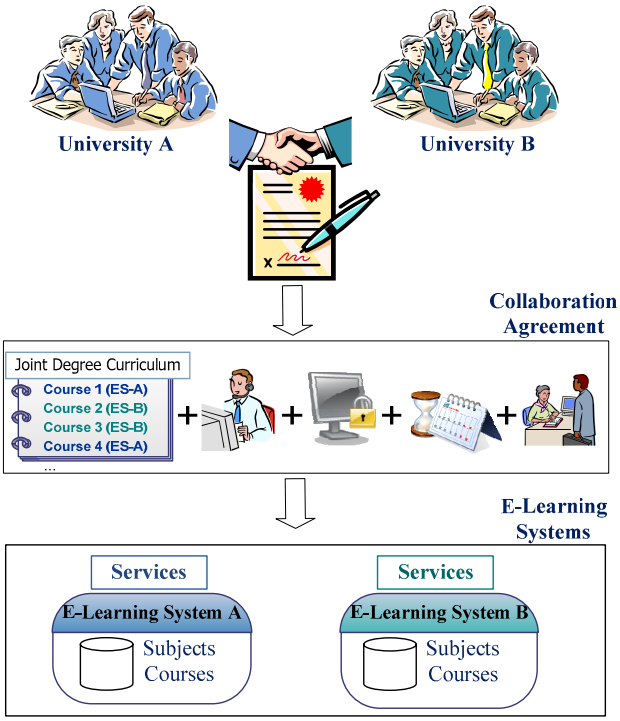

FIGURE 1
JOINT DEGREES IN E-LEARNING SYSTEMS

Figure 1 shows the functional model of the project. Two or more e-Learning systems may participate in the development of joint degrees. To make it possible, universities should establish collaboration agreements that would specify the following aspects:

- Joint curricula.
- Teaching and administrative staff.
- Access control and security policies.
- Duration and conditions of the agreement.
- Admission requirements. For example, the required education level, languages etc.
- Credit format.
- Legal Aspects.

In this context, a joint degree can be defined as an academic program, made up of a cluster of services that are offered by universities through their e-Learning systems. These services will offer support to academic and administrative processes, all of which are included in an academic program. The services will be combined and federated, according to the agreement established by the universities involved.

Interesting initiatives have proposed frameworks based on a service-oriented approach for e-Learning systems [5]-[6]. The services defined in the existing e-Learning Frameworks are very useful to support typical e-Learning applications. However, the development of a joint degree through these frameworks is not possible because of the lack of services oriented toward the management of joint curricula.

Based on these aforementioned frameworks, we propose the design of a service-oriented architecture made up of an identity provider, a service broker and service providers (e-Learning systems). The identity provider is responsible for controlling identity and validity of users. The service broker is responsible for managing the federation of services and service providers are responsible for publishing and offering services that allow access to other e-Learning services.

The main difference between the existing e-Learning frameworks and our approach is the creation of new service category called "Joint Degrees Services". The objective of this category is to define the missing services in other frameworks to allow the development of joint degrees in e-Learning systems.

PROJECT STATUS

Interfaces of the following services are being currently identified and specified for the category of "Joint Degrees Services":

- Design of joint curricula.
- Establishing collaboration agreements and access policies.
- Management of courses: coordination and control in carrying out services.
- Notification of Services: reporting any events in the services.

Collaboration agreements should be translated into a policy language, which will specify the requirements, preferences and constrains that have to be taken into account in the composition and execution of the services needed to develop a joint degree. Therefore, the analysis of different languages of specifications for policies and execution of services [7]-[8]-[9] is being carried out.

A prototype based on Web Services and Web 2.0 that allows the implementation of the architecture proposed is being developed. Open Source E-learning Systems such as Claroline (http://www.claroline.net/) and Moodle (http://moodle.org/) are being used for such purpose.

IMS Learner Information Packaging (http://www.imsglobal.org/profiles/index.html) is being used for exchanging information with the user.

CONCLUSION AND FUTURE PLANS

Service Oriented Architecture provides a correct framework to control and develop joint degrees. It is important to encourage service building in E-Learning systems in order to make the communication and integration with other systems easier.

The implementation of the architecture is complex, however it will allow us the identification of main components that an e-Learning system needs to adapt in order to participate in the development of Joint Degrees. Our further work involves validating correct interpretation of collaboration agreements and the respective execution of services. Finally, once the implementation of the prototype is finalized, tests using different systems of e-Learning from our school will be carried out.

REFERENCES

[1] Reichert S, and Tauch Ch, "Trends in Learning Structures in European Higher Education III. Bologna four years after: Steps towards sustainable reform of higher education in Europe", *European Universities Association*, Graz, Austria, May 2003.

[2] Aguirre S, Brantner S, Huber G, Markus S, Miklós Z et al., "Corner Stones of Semantic Interoperability Demonstrated in a Smart Space for Learning", *Poster Proceedings of the European Semantic Web Conference 2005*, Eds. Heraklion, Greece, 2005.

[3] *Conference 2005*, Eds. Heraklion, Greece, 2005.

[4] CORDRA (Content Object Repository Discovery and Registration / Resolution Architecture) website, http://cordra.net, accessed on April 24, 2008.

[5] The e-Learning Framework, Website: http://www.elframework.org, accessed on March 12, 2008.

[6] Open Knowledge Initiative Website, http://www.okiproject.org, accessed on April 8, 2008.

[7] Weerawarana S, and Curbera F, "Business Process with BPEL4WS: Understanding BPEL4WS, Part 1", http://www.ibm.com/developerworks/library/ws-bpelcol1/, accessed on March 21, 2008.

[8] Web Services Federation Language. http://www-128.ibm.com/developerworks/library/specification/ws-fed/, accessed on March 21, 2008.

[9] Gorton S, Montenegro C, Reiff-Marganiec S, and Semini L. "StPowla: SOA, Policies and Workflows". *Proceedings of WESOA 2007, Vienna, Austria, September* 2007.